

## **REMARKS**

Reconsideration of the subject application is respectfully requested in view of the foregoing amendment and remarks below. Claims 1 and 21-25 have been amended. Claims 26 and 27 have been canceled. Therefore, upon entry of the foregoing amendment, claims 1-25 remain pending. Support for the amendment to claims 1 and 21-25 can be found in the subject specification at, *inter alia*, page 7, paragraph [027].

### **Rejection of claims 26 and 27 under 35 U.S.C. §112, 2d paragraph**

Claims 26 and 27 stand rejected under 35 U.S.C. §112, 2d paragraph as allegedly being indefinite because the preamble of each of these claims recites a “system” and the Examiner contends that a “system” is not a proper statutory class of invention. The Examiner states that the claims have been treated as method claims, and if the claims are rewritten as “apparatus” claims, they will be restricted because there is no provision for apparatus claims in Class 71 (fertilizers), which presumably, is the Class for which the Examiner is responsible.

Claims 26 and 27 are each intended to define an apparatus. It is respectfully submitted that one of ordinary skill in the art would readily understand that the term “system,” in the context of the present application, is used to define an “apparatus.” Therefore, the claims would not be indefinite to a person of ordinary skill in the art. Applicants are aware of no precedent supporting the proposition that a claim cannot use the term “system” in the preamble to define an apparatus (or “machine” as set forth in 35 U.S.C. §101).

Notwithstanding the foregoing remarks, Applicants have canceled claims 26 and 27 to expedite prosecution of the subject application. The rejection is therefore obviated. Because the Examiner has stated that she would restrict apparatus claims 26 and 27 from examination if not amended as “method” claims, Applicants respectfully reserve the right to file, without prejudice, a divisional application directed to the subject matter of these claims.

**Rejection of claims 1-27 under 35 U.S.C. §103(a) over Burnham (U.S. Patent No. 5,135,664) and Burnham (U.S. Patent No. 5,835,590) in view of WO 97/21647, Nicholson (U.S. Patent No. 4,554,002) and Nicholson et al. (U.S. Patent No. 4,902,431)**

Claims 1-27 have been rejected under 35 U.S.C. §103(a) as allegedly being obvious over Burnham (U.S. Patent No. 5,135,664) and Burnham (U.S. Patent No. 5,835,590) in view of WO 97/21647, Nicholson (U.S. Patent No. 4,554,002) and Nicholson et al. (U.S. Patent No. 4,902,431). This rejection is traversed insofar as the Examiner considers it applicable to any of claims 1-25 remaining in the application upon entry of the foregoing amendment.

The present invention relates to methods of disinfecting and stabilizing organic waste so as to produce a stable, granular bio-mineral product, which has reduced levels of harmful pathogens. The methods include intimately mixing organic waste with one or more mineral by-products to form a mixture having a pH less than about 9, and heating and drying the mixture to produce a stable, granular bio-mineral product. Suitable mineral by-products according to the present invention include those that will result in the mixture having a pH below about 9, thereby minimizing the production of odor-causing gases, such as ammonia and methyl amines from the organic waste. The present invention also relates to a stable, granular bio-mineral product produced by these methods. The invention further relates to fertilizers, soil amendments and soil substitutes that include these stable, granular bio-mineral products.

In contrast to prior art methods, the present invention maintains the pH of the mixture of organic waste and mineral by-product at a level less than about 9 throughout the process. Applicants have discovered that increased heating and drying efficiency resulting from the addition of the mineral by-product allows for the production of a stable, granular bio-mineral product without increasing the pH to levels of around 12 or higher as taught in the prior art and believed to be necessary to achieve disinfection by alkaline stabilization in accordance with applicable regulatory requirements, e.g., EPA "Class A" sludge standards. Moreover, as a result of the increased heating and drying efficiency, it is possible to obtain the stable, granular bio-mineral product at lower time-temperature combinations. The advantages of decreased energy consumption and increased throughput directly follow from processing of the organic waste at lower temperatures and for shorter time periods. Moreover, the lower pH minimizes ammonia and amine odor generation as occurs at higher pH levels, and results

in a lower pH product that is more suitable for direct application to land without further pH lowering.

It is respectfully submitted that the person having ordinary skill in the art, in view of the prior art, would not reasonably expect that organic waste treated in accordance with the method of the present invention, while maintaining pH at less than about 9 throughout the process, would successfully result in a stable, granular bio-mineral product as described in the subject application.

The examiner correctly notes that, in contrast to the claimed pH of *less than about 9*, each of Burnham '664 and Burnham '590 teaches raising the pH to above 12 for a period of time. It is not optional in either of these patent references to elevate the pH to a level of less than about 9. Burnham '664 teaches that the sludge, *after having its pH raised to 12 and above for at least two hours*, is then treated with carbon dioxide gas to reduce the pH of the sludge to below 10 to reduce ammonia nitrogen emission. The pH, though, must be initially raised to 12 or higher. Contrary to the Examiner's assertion, Burnham '590 does not appear to disclose reducing pH to below 10 to reduce ammonia nitrogen emission.

The process of the claimed invention does not result in an elevation of the pH above about 9 at any time. This is made clear by the amendments to independent claims 1 and 21-25 that the pH is maintained at a level of less than about 9 throughout the method. Thus, Burnham '664 and '590 teach away from the claimed invention by requiring pH elevation (at least initially) to a significantly higher level of 12 or above. Indeed, to modify either of the Burnham '664 or Burnham '590 processes to meet the claimed limitation of a pH of less than about 9, maintained throughout the process, would effectively destroy the teachings of these references. One of ordinary skill in the art would simply not look to a reference disclosing the necessity of attaining a pH of 12 or higher to obtain sludge stabilization and reasonably conclude that it would be obvious to elevate the pH to only less than about 9. Therefore, it is respectfully submitted that neither Burnham '664 nor Burnham '590 can or does render the claimed invention *prima facie* obviousness.

None of the secondary references relied upon by the Examiner obviates the fact that Burnham cannot properly be the basis for a *prima facie* obviousness rejection because it teaches elevation of pH to 12 or above. Notwithstanding the clear requirement of a pH of 12 or higher in the Burnham references, the Examiner relies upon WO '647 as teaching elevating the pH to a range of 7.0-10.5, with an optimum pH of 9.5 to minimize the release of ammonia, hydrogen sulfide, and other odor-producing elements. The Examiner also relies

on Nicholson '002 for teaching that elevation of the pH to a level above 9.0 will cause the release of ammonia. The Examiner relies on Nicholson '431 for teaching the use of a combination of mineral by-products. The Examiner concludes that it would be obvious to increase the pH in the process of the primary references (i.e. Burnham '664 and '590) to avoid the production of offensive odors as taught by WO '647 and Nicholson '002.

Again, the Examiner's conclusion of obviousness would improperly destroy the teaching of the primary references of elevating the pH to above 12. The obviousness rejection is, therefore, respectfully traversed.

Moreover, Nicholson '002, which the Examiner cites as teaching that a pH of less than about 9 will cause the release of ammonia, also teaches that the sludge should be elevated in pH to levels greater than 9, preferably 12 or higher. In fact, the very passage that the Examiner relies upon at col. 10, teaches that "the positive effects of high pH in most cases will be more important than the loss of ammonia." At col. 10, ln. 66-col. 11, ln. 2, Nicholson '002 states that "[p]referably, sufficient kiln dust or a combination of kiln dust and caustic material (up to 15% of the kiln dusts) is provided to generate a pH in excess of 12 for at least two hours to meet EPA criteria for 'a process to reduce pathogens'." Indeed, the claims of Nicholson '002 also require raising the pH "to at least 12" and maintaining it at this level for at least about two hours. These teachings cannot be ignored when considering Nicholson '002 and the prior art as a whole. In context, Nicholson '002 teaches that less ammonia is released at lower pH, but that higher pH values, preferably in excess of 12, are most desirable to produce a disintegrable, friable product that can be applied to land as a soil conditioner.

WO '647 merely teaches adding an alkaline material such as lime, fly ash, cement kiln dust or mixtures thereof to animal manure to minimize the release of odor producing-elements from the manure. WO '647 teaches that the pH is elevated by the addition of such material to a minimum of 7, a maximum of 10.5 and an optimum value of 9.5. WO '647 does not teach either heating or drying of the resultant mixture, let alone the combination of heating and drying, as presently claimed. The steps of heating and drying are essential to obtaining a "stable, granular bio-mineral product" in accordance with the present invention, particularly when the pH is not elevated to above 9. Moreover, the fact that WO '647 teaches that a pH of 9.5 is an "optimum value" reasonably suggests to a person of ordinary skill in the art that maintaining a pH of less than about 9, as presently claimed, would be less than optimum and should be avoided, if possible. Again, modification of either of the Burnham

references in view of WO '647 would effectively destroy the teaching therein of pH elevation to 12 or above.

Nicholson '431, while cited for its teaching of using a mixture of mineral by-products, also discloses elevation of the pH to 12 and above for a predetermined time period. Nicholson '431, therefore, does not alleviate the failure of the prior art to suggest maintaining the pH below about 9 throughout the method.

In summary, it is respectfully submitted that there is no suggestion in the combination of the prior art for one of ordinary skill in the art, with a reasonable expectation of success, to eliminate a step of elevation of the pH to 12 or above as taught in the Burnham references, while heating and drying, to obtain a product in accordance with the present invention. Reconsideration and withdrawal of this ground of rejection is, therefore, respectfully requested.

**Rejection of claims 1-27 under the judicially created doctrine of obviousness-type double patenting over claims 1-25 of U.S. Patent No. 6,248,148 in view of WO 97/21647 and Nicholson et al. (U.S. Patent No. 4,902,431)**

Claims 1-27 have been rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being obvious over claims 1-25 of U.S. Patent No. 6,248,148 in view of WO 97/21647 and Nicholson et al. (U.S. Patent No. 4,902,431). This rejection is traversed insofar as the Examiner considers it applicable to any of claims 1-25 remaining in the application upon entry of the foregoing amendment.

As discussed above, the present invention is directed to producing a stable, granular bio-mineral product by intimately mixing a mineral by-product with the organic waste to form a mixture having a pH less than about 9 and heating and drying the mixture, wherein the pH remains less than about 9 throughout the method.

The claims of the '148 patent are directed to a method for treating organic waste by raising the pH of the organic waste to approximately 9.5 to release gaseous ammonia into pore spaces created within the organic material, thereby disinfecting the organic waste by action of the released gaseous ammonia. The specification of the '128 patent, at col. 4, lns. 8-10, recites that gaseous ammonia may be released from the organic waste "by raising the pH of the organic waste material to a minimum of approximately 9.5." The claims of the subject application recite maintaining the pH below about 9. By reciting a pH of 9.5, it is respectfully submitted that the claims of the '148 patent, in light of the specification, teach

away from a pH of "below about 9." The claims of the '148 patent also do not teach or suggest heating and drying the mixture of the organic waste and mineral by-product.

WO '647 and Nicholson '431 do not alleviate the deficiencies of the '148 patent claims. WO '647, as discussed above, is directed merely to reducing odor of manure by increasing the pH thereof to an optimum value of 9.5. It neither teaches nor suggests a process wherein the pH is maintained below about 9 nor heating and drying the mixture of organic waste and mineral by-product to produce a stable, granular bio-mineral product. Therefore, modification of the claims of the '148 patent in view of WO '647 would not result in the claimed invention, nor render it obvious. Nicholson '431, while cited for its teaching of using a mixture of mineral by-products, also discloses elevation of the pH to 12 and above for a predetermined time period. Nicholson '431, therefore, does not suggest modification of the claims of the '148 patent to maintain the pH below about 9 throughout the method.

In view of the foregoing, reconsideration and withdrawal of the obviousness-type double patenting rejection is respectfully requested.

**Rejection of claims 1-27 under the judicially created doctrine of obviousness-type double patenting over claims 1-25 of U.S. Patent No. 6,405,664 in view of WO 97/21647 and Nicholson et al. (U.S. Patent No. 4,902,431)**

Claims 1-27 have been rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being obvious over claims 1-25 of U.S. Patent No. 6,405,664 in view of WO 97/21647 and Nicholson et al. (U.S. Patent No. 4,902,431). This rejection is traversed insofar as the Examiner considers it applicable to any of claims 1-25 remaining in the application upon entry of the foregoing amendment.

As discussed above, the present invention is directed to producing a stable, granular bio-mineral product by intimately mixing a mineral by-product with the organic waste to form a mixture having a pH less than about 9 and heating and drying the mixture, wherein the pH remains less than about 9 throughout the method.

The claims of the '664 patent are directed to a method for treating organic waste by mixing the organic waste with coal combustion by-products to form a mixture having a pH of at least 9.5, drying the mixture to liberate ammonia and introducing the liberated ammonia into a coal burner of a coal burning power plant to reduce nitrogen oxides emission. The claims of the subject application recite maintaining the pH below about 9. By reciting a pH

of “at least 9.5”, it is respectfully submitted that the claims of the ‘664 patent teach away from a pH of “below about 9.”

WO ‘647 and Nicholson ‘431 do not alleviate the deficiencies of the ‘664 patent claims. WO ‘647, as discussed above, is directed merely to reducing odor of manure by increasing the pH thereof to an optimum value of 9.5. It neither teaches nor suggests a process wherein the pH is maintained below about 9 nor heating and drying the mixture of organic waste and mineral by-product to produce a stable, granular bio-mineral product. Therefore, modification of the claims of the ‘664 patent in view of WO ‘647 would not result in the claimed invention, nor render it obvious. Nicholson ‘431, while cited for its teaching of using a mixture of mineral by-products, also discloses elevation of the pH to 12 and above for a predetermined time period. Nicholson ‘431, therefore, does not suggest modification of the claims of the ‘664 patent to maintain the pH below about 9 throughout the method.

In view of the foregoing, reconsideration and withdrawal of the obviousness-type double patenting rejection is respectfully requested.

**Rejection of claims 1-27 under the judicially created doctrine of obviousness-type double patenting over claims 1-16 of U.S. Patent No. 6,402,801 in view of Nicholson et al. (U.S. Patent No. 4,902,431)**

Claims 1-27 have been rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being obvious over claims 1-16 of U.S. Patent No. 6,402,801 in view of Nicholson et al. (U.S. Patent No. 4,902,431). This rejection is traversed insofar as the Examiner considers it applicable to any of claims 1-25 remaining in the application upon entry of the foregoing amendment.

As discussed above, the present invention is directed to producing a stable, granular bio-mineral product by intimately mixing a mineral by-product with the organic waste to form a mixture having a pH less than about 9 and heating and drying the mixture, wherein the pH remains less than about 9 throughout the method.

The claims of the ‘801 patent are directed to a method for treating organic waste by releasing gaseous ammonia from the organic waste and retaining the released ammonia within the waste and immobilizing a pollutant within the organic waste. The specification of the ‘801 patent, at col. 4, lns. 49-51, recites that gaseous ammonia may be released from the organic waste “by raising the pH of the organic waste material to a minimum of approximately 9.5.” The claims of the subject application recite maintaining the pH below

about 9. Thus, the claims of the '801 patent, as read by a person having ordinary skill in the art in light of the specification of the '801 patent, teach away from a pH of "below about 9." The claims of the '801 patent also do not teach or suggest heating and drying the mixture of the organic waste and mineral by-product.

Nicholson '431, while cited for its teaching of using a mixture of mineral by-products, discloses elevation of the pH to 12 and above for a predetermined time period. Nicholson '431, therefore, does not suggest modification of the claims of the '801 patent to maintain the pH below about 9 throughout the method.

In view of the foregoing, reconsideration and withdrawal of the obviousness-type double patenting rejection is respectfully requested.



**CONCLUSION**

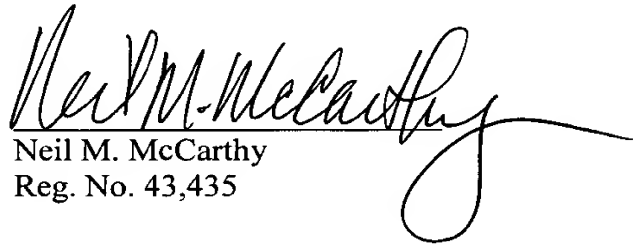
It is respectfully submitted that the subject application is now in condition for allowance, which action is earnestly solicited.

The Examiner is invited, upon consideration of the foregoing response, to contact Applicant's representative to discuss any issue that would expedite allowance of the subject application.

The Commissioner is authorized to charge any fees required under 37 C.F.R. §1.16 and/or §1.17 in connection with this filing, or to credit any overpayments, to Deposit Account 11-0600.

Respectfully submitted,

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